

## CLAIMS

### What is claimed is:

1. A method for inhibiting fertilization, the method comprising administering an effective amount of a compound to an animal, the compound comprising at least one sulfonated compound, wherein the compound interacts with sperm and wherein the at least one sulfonated compound is selected from the group consisting of: a lignosulfonic acid (LSA), a polyanetholesulfonic acid (PASA), a polyvinylsulfonic acid, a poly(2-acrylamido-2-methyl-1-propanesulfonic acid), a poly(2-acrylamido-2-methyl-1-propanesulfonic acid co-acrylonitrile), a poly(2-acrylamido-2-methyl-1-propanesulfonic acid-co-styrene), a poly(4-vinylpyridinium p-toluenesulfonate), a sulfonic acid azo dye, a sulfonic acid derivative of a porphyrin, a sulfonic acid derivative of a triphenylmethane, a sulfonic acid derivative of a stilbene, a sulfonated phenylpropane, a sulfonated kraft lignin, and derivatives thereof.
2. The method of claim 1, wherein the interaction occurs at surface of the sperm.
3. The method of claim 1, wherein the interaction occurs at head of the sperm.
4. The method of claim 1, wherein the interaction is the at least one sulfonated compound binding to the sperm.
- 20 5. The method of claim 1, wherein the compound is a polysulfonated compound.
6. The method of claim 1, wherein the compound is in an aqueous solution.
7. The method of claim 1, wherein the compound inhibits the sperm interaction to a zona pellucida.

8. The method of claim 1, further comprising treating the sperm with the compound for at least about 3 minutes.

9. The method of claim 8, wherein the treatment occurs at about room temperature.

5 10. The method of claim 8, wherein the treatment occurs at about 37°C.

11. The method of claim 1, wherein the compound is administered after ejaculation.

12. The method of claim 1, wherein the compound is administered prior to ejaculation.

10 13. The method of claim 1, wherein the compound is administered vaginally.

14. The method of claim 1, wherein the compound is in a formulation, wherein the formulation is selected from the group consisting of a foam, a cream, a gel, a jelly, a douche, an aerosol, a film, a tablet, a sponge, a vaginal suppository, an impregnated 15 tampon, a controlled delivery device, a vaginal ring, an intrauterine device, a lubricant on a male condom, a lubricant on a female condom, a lubricant on a cervical cap and a lubricant on a cap diaphragm.

15. The method of claim 1, wherein the animal is a primate.

16. A method for inhibiting fertilization, the method comprising 20 administering an effective amount a compound derived from a natural source to an animal, the compound comprising at least one sulfonated compound, wherein the at least one sulfonated compound interacts with sperm.

17. The method of claim 16, wherein the at least one sulfonated compound is a polysulfonated compound.

25 18. The method of claim 16, wherein the at least one sulfonated compound is a lignosulfonic acid (LSA).

19. The method of claim 16, wherein the natural source is a lignin.

20. The method of claim 16, wherein the natural source is a plant, a fungus or an algae.

21. The method of claim 16, where the interaction occurs at surface of the 5 sperm.

22. The method of claim 16, wherein the interaction occurs at head of the sperm.

23. The method of claim 16, wherein the interaction is the at least one sulfonated compound binding to the sperm.

10 24. The method of claim 16, wherein the compound inhibits the sperm interaction to a zona pellucida.

25. The method of claim 16, further comprising treating the sperm with the compound for at least about 3 minutes.

15 26. The method of claim 25, wherein the treatment occurs at about room temperature.

27. The method of claim 25, wherein the treatment occurs at about 37°C.

28. The method of claim 16, wherein the compound is administered after ejaculation.

29. The method of claim 16, wherein the compound is administered prior 20 to ejaculation.

30. The method of claim 16, wherein the compound is administered vaginally.

31. The method of claim 16, wherein the compound is in a formulation, wherein the formulation is selected from the group consisting of a foam, a cream, a gel, a

jelly, a douche, an aerosol, a film, a tablet, a vaginal suppository, a sponge, an impregnated tampon, a controlled delivery device, a vaginal ring, an intrauterine device, a lubricant on a male condom, a lubricant on a female condom, a lubricant on a cervical cap and a lubricant on a cap diaphragm.

5                   32.     The method of claim 16, wherein the animal is a primate.

                      33.     A method for inhibiting fertilization, the method comprising administering an effective amount of a compound to an animal, the compound comprising at least one lignin or a derivative thereof, wherein the compound interacts with sperm.

                      34.     The method of claim 33, wherein the derivative is sulfated.

10                 35.     A composition comprising at least one sulfonated compound, a pharmaceutically acceptable excipient and a sperm, wherein the at least one sulfonated compound is selected from the group consisting of: a lignosulfonic acid (LSA), a polyanetholesulfonic acid (PASA), a polyvinylsulfonic acid, a poly(2-acrylamido-2-methyl-1-propanesulfonic acid), a poly(2-acrylamido-2-methyl-1-propanesulfonic acid co-acrylonitrile), a poly(2-acrylamido-2-methyl-1-propanesulfonic acid-co-styrene), a poly(4-vinylpyridinium p-toluenesulfonate), a sulfonic acid azo dye, a sulfonic acid derivative of a porphyrin, a sulfonic acid derivative of a triphenylmethane, a sulfonic acid derivative of a stilbene, a sulfonated phenylpropane, a sulfonated kraft lignin, and derivatives thereof.

15                 36.     The composition of claim 35, wherein the compound is a polysulfonated compound.

20                 37.     A composition comprising at least one sulfonated compound and a spermicide, wherein the at least one sulfonated compound is selected from the group consisting of: a lignosulfonic acid (LSA), a polyanetholesulfonic acid (PASA), a polyvinylsulfonic acid, a poly(2-acrylamido-2-methyl-1-propanesulfonic acid co-acrylonitrile), a poly(2-acrylamido-2-methyl-1-propanesulfonic acid-co-styrene), a poly(4-vinylpyridinium p-toluenesulfonate), a sulfonic acid azo dye, a sulfonic acid derivative of a porphyrin, a sulfonic acid derivative of a

triphenylmethane, a sulfonic acid derivative of a stilbene, a sulfonated phenylpropane, a sulfonated kraft lignin, and derivatives thereof.

38. A contraceptive device comprising a device and at least one sulfonated compound in a formulation, wherein the device is selected from one or more of: a sponge, a tampon, an intrauterine device, a vagina ring, a male condom, a female condom, a cervical cap or a diaphragm, wherein the formulation is selected from the group consisting of a foam, a cream, a gel, a jelly, a douche, an aerosol, a film, a suppository and a tablet, and wherein the at least one sulfonated compound is selected from the group consisting of: a lignosulfonic acid (LSA), a polyanetholesulfonic acid (PASA), a polyvinylsulfonic acid, a poly(2-acrylamido-2-methyl-1-propanesulfonic acid), a poly(2-acrylamido-2-methyl-1-propanesulfonic acid co-acrylonitrile), a poly(2-acrylamido-2-methyl-1-propanesulfonic acid co-styrene), a poly(4-vinylpyridinium p-toluenesulfonate), a sulfonic acid azo dye, a sulfonic acid derivative of a porphyrin, a sulfonic acid derivative of a triphenylmethane, a sulfonic acid derivative of a stilbene, a sulfonated phenylpropane, a sulfonated kraft lignin, and derivatives thereof.

39. A composition comprising a compound isolated from a natural source, a pharmaceutically acceptable excipient and a sperm, wherein the compound interacts with the sperm and wherein the compound comprises at least one sulfonated compound.

40. The composition of claim 39, wherein the at least one sulfonated compound is a lignosulfonic acid (LSA).

41. The composition of claim 39, wherein the natural source is a lignin.

42. The composition of claim 39, wherein the natural source is a plant, a fungus or an algae.

43. A composition comprising a compound isolated from a natural source and a spermicide, wherein the compound comprises at least one sulfonated compound.

44. The composition of claim 43, wherein the at least one sulfonated compound is a lignosulfonic acid (LSA).

45. A contraceptive device comprising a device and a compound isolated from a natural source, the compound comprising at least one sulfonated compound in a formulation, wherein the device is selected from one or more of: a sponge, a tampon, an intrauterine device, a vagina ring, a male condom, a female condom, a cervical cap or a diaphragm and wherein the formulation is selected from the group consisting of a foam, a cream, a gel, a jelly, a douche, an aerosol, a film, a suppository and a tablet.

5 46. The contraceptive device of claim 45, wherein the sulfonated compound is a lignosulfonic acid (LSA).

10 47. The contraceptive device of claim 45, wherein the natural source is a plant, a fungus or an algae.

48. The contraceptive device of claim 45, wherein the natural source is a lignin.

49. A composition comprising a lignin or a derivative thereof, a pharmaceutically acceptable excipient and a sperm.

15 50. The composition of claim 49, wherein the derivative is sulfated.

51. A composition comprising a lignin or a derivative thereof and a spermicide.

52. The composition of claim 51, wherein the derivative is sulfated.

20 53. A contraceptive device comprising a device and a compound comprising at least one lignin or a derivative thereof in a formulation, wherein the device is selected from one or more of: a sponge, a tampon, an intrauterine device, a vagina ring, a male condom, a female condom, a cervical cap or a diaphragm and wherein the formulation is selected from the group consisting of a foam, a cream, a gel, a jelly, a douche, an aerosol, a film, a suppository and a tablet.

25 54. The contraceptive device of claim 53, wherein the derivative is sulfated.

55. A method of inhibiting fertilization, the method comprising administering an effective amount of a compound to an animal, the compound comprising at least one sulfonated compound, wherein the compound interacts with sperm and wherein the at least one sulfonated compound is other than a polystyrene sulfonate, a long chain alkyl sulfonate, a long chain alkenyl sulfonate, a sulfoalkyl alkanoate salt, a sodium tetradecyl sulfonate, a sulfonated hesperidin, a substituted benzenesulfonic acid formaldehyde co-polymer, a  $H_2SO_4$ -modified mandelic acid, a condensation polymer product produced a condensation reaction of an aromatic sulfonic acid and an aldehyde, a formaldehyde naphthalenesulfonic acid condensation polymer, a 8-anilino-1-naphthalenesulfonate, a N-(6 aminohexyl)-5-chloro-1-naphthalenesulfonamide, a N-(6 aminohexyl)-5-chloro-2-naphthalenesulfonamide, and a N-(6 aminohexyl)-5-bromo-2-naphthalenesulfonamide.